
Rapid and Efficient Directed Differentiation of Human Pluripotent Stem Cells Into Retinal Pigmented Epithelium.

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Authors: David E Buchholz, Britney O Pennington, Roxanne H Croze, Cassidy R Hinman, Peter J Coffey, Dennis O Clegg

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Public Summary:

Controlling the differentiation of human pluripotent stem cells is the goal of many laboratories, both to study normal human development and to generate cells for transplantation. One important cell type under investigation is the retinal pigmented epithelium (RPE). These cells are found in the back of the eye and nourish the retina. Age-related macular degeneration (AMD), the leading cause of blindness in the Western world, is caused by dysfunction and death of the RPE. Currently, RPE derived from human embryonic stem cells are in clinical trials for the treatment of AMD. Although protocols to generate RPE from human pluripotent stem cells have become more efficient since the first report in 2004, they are still time-consuming and relatively inefficient. We have improved upon the method to generate RPE; our method is much faster than those previously reported. We found that the addition of defined growth factors at specific times leads to conversion of approximately 80% of the cells to become RPE in only 14 days. This method should be useful for rapidly generating RPE for transplantation as well as for studying RPE development in the lab.

Scientific Abstract:

Controlling the differentiation of human pluripotent stem cells is the goal of many laboratories, both to study normal human development and to generate cells for transplantation. One important cell type under investigation is the retinal pigmented epithelium (RPE). Age-related macular degeneration (AMD), the leading cause of blindness in the Western world, is caused by dysfunction and death of the RPE. Currently, RPE derived from human embryonic stem cells are in clinical trials for the treatment of AMD. Although protocols to generate RPE from human pluripotent stem cells have become more efficient since the first report in 2004, they are still time-consuming and relatively inefficient. We have found that the addition of defined factors at specific times leads to conversion of approximately 80% of the cells to an RPE phenotype in only 14 days. This protocol should be useful for rapidly generating RPE for transplantation as well as for studying RPE development in vitro.

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